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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,615

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Reno Emilio Beltrame

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EXAMINER

NGUYEN, VU ANH

ART UNIT

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1796

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/583,615	Applicant(s) BELTRAME ET AL.	
	Examiner Vu Nguyen	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/20/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claim 15 is objected to because of the following informalities: The term "acrylic" in line 2 is mis-spelled.
2. Claim 10 is objected to because of improper recitation of Markush group. The format should be "selected from the group consisting of....and..." If a Markush group is not intended, then the format should be "selected from one or more of....or..."

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This claim recites a high molecular weight thermoplastic acrylic resin. However, it is not clear what range constitutes a "high" molecular weight. A definition for this "high molecular weight thermoplastic acrylic resin" is not given in the disclosure.

Claim Rejections - 35 USC § 102/103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5, 8-12, 14, and 17-18 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Batdorf et al. (US 6,342,556 B1).

8. Regarding the limitations set forth in these claims, Batdorf et al. (Batdorf, hereafter) teaches an acrylic latex composition comprising an acrylic latex binder and nanoparticulate zinc oxide UV absorber (col. 2, lines 10-38). The zinc oxide nanoparticles have an average size of 10-80 nm but more preferably less than 60 nm (col. 2, lines 27-35). The amount of the ZnO nanoparticles in the composition is 0.6-2.0 wt% (col. 4, line 10). Since the acrylic latex has a solids content of 40-60 wt% and its amount in the composition is 30-50 wt% (col. 3, lines 30 & 44), the amount of the ZnO nanoparticles relative to the solids content of the composition is still within the range claimed in claim 4. The acrylic latex is prepared from esters of acrylic and methacrylic acid and other copolymerizable monomers (col. 2, lines 12-17). The composition, comprising acrylic latex in water, is considered an oil-in-water emulsion composition (Example 1). The acrylic latex includes acrylic polymer resins in aqueous emulsion (col. 3, lines 30-35). The solids content of the composition is about 25-30 wt% (Example 1).

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A method of preparing the disclosed composition is also taught, comprising dispersing the ZnO nanoparticles in an aqueous dispersion of the acrylic latex (Example 1). The disclosed composition is a coating composition and further comprises anti-foam agents, wetting aids (i.e., surfactants), and stabilizers (col. 4, lines 16-19). The coating composition is used for any substrate that requires protection from algae, fungal or bacterial growth and/or UV protection (col. 3, lines 14-21). Textile substrates are implicitly included (col. 1, lines 51-54). Although the prior art is silent on an acid value of the acrylic resin, it is reasonable to expect the disclosed acrylic resin to have an acid number less than 50 mg-KOH/100 g for the following reasons. It is well known in the art that a resin having high acid value has good solubility or dispersibility in aqueous medium but, when applied as a coating, has very poor water resistance. The coating composition taught by Batdorf is designed to form a water-resistant film on a substrate (col. 3, lines 36-38). Batdorf also teaches that ZnO particles are reactive with acids (col. 1, line 26). Thus, it is reasonable to expect the disclosed acrylic resin to have an acid number less than 50 mg-KOH/100 g. Even if the disclosed resin does not inherently possess such an acid value, it is rather obvious to expect the resin to have such low acid value since the composition taught by Batdorf is designed so that the binder is dispersible in the aqueous medium, the integrity of the ZnO nanoparticles is not compromised, and the resulting coatings are water-resistant. Because the PTO does not have proper means to conduct experiments, the burden of proof is now shifted to the applicants to show otherwise. See MPEP § 2112 (I-V).

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Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batdorf et al. (US 6,342,556 B1) in view of the Acrylamac Acrylic Resins from Hexion (www.hexion.com).

12. Regarding the limitations set forth in these claims, the acrylic composition of claim 1 has been shown to be unpatentable over Batdorf as discussed above. However, Batdorf fails to teach an acrylic binder that is a thermoplastic acrylic resin or a thermosetting acrylic resin.

13. Hexion Specialty Chemicals has been manufacturing and selling thermoplastic and thermosetting acrylic resins known as Acrylamac series having low acid number for various applications (<http://www.hexion.com/Products/Main.aspx?id=1799>). For instance, Acrylamac 16-1066 is a thermoplastic solution acrylic resin having good film-

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forming property, having an acid value of 4 mg-KOH/100 g solids, and exhibiting fast dry times, excellent gloss and excellent particle-dispersion characteristics. Another example is Acrylamac 17-1100, which is a thermosetting solution acrylic resin having an acid value of 15 mg-KOH/100 g solids and a hydroxyl number of 87 mg-KOH/100 g solids. This product "provides a long-lasting coating with good corrosion resistance, appearance, gloss, and color retention" and is "ideally suited for use on large structures or objects where superior durability is a requirement." Although these resins are sold in toluene solution form, they can readily be formulated into aqueous coating compositions in the form of, for example, oil-in-water emulsion.

14. In light of the benefits provided by Hexion's thermoplastic and thermosetting acrylic resins and considering that the low acid values of these resins will not interfere with the objective being sought by Batdorf, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified the composition taught by Batdorf by replacing the acrylic latex binder with Hexion's thermoplastic acrylic resin or thermosetting acrylic resin so that the spectrum of applications of the compositions can be expanded. Thus, a flexible anti-UV degradation coating and a tough durable anti-UV degradation coating can be formulated using Hexion's thermoplastic acrylic resin and Hexion's thermosetting resin, respectively, in the coating composition taught by Batdorf.

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15. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Batdorf et al. (US 6,342,556 B1) in view of Liufu et al. (*Polymer Degradation and Stability*, 87 (2005) 103-110; published on the web in September 2004).

16. Regarding the limitations in this claim, the acrylic composition of claim 1 has been shown to be unpatentable over Batdorf as set forth above. Batdorf employs ZnO nanoparticles that are commercially available and, consequently, fails to teach a process for reducing the size of large-size ZnO particles.

17. Liufu et al. (Liufu, hereafter) discloses a study on thermal analysis and degradation mechanism of polyacrylate/ZnO nanocomposites (Title). Liufu teaches a method of reducing the size of large ZnO particles to about 20 nm by milling the large ZnO particles in the presence of a dispersant (section 2.2). The dispersant is a polymeric surfactant (section 2.1). The resulting ZnO nanoparticles have size of about 20 nm (section 2.1) and highly dispersed in aqueous medium (section 2.2).

18. Milling in the presence of a dispersant is a well known process for reducing the size of organic and inorganic particles (such as pigments). If commercial sources of the small-size ZnO nanoparticles taught by Batdorf were expensive to obtain, not well dispersed, or for some other reasons, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have employed the method taught by Liufu to reduce the size of large-size ZnO particles and employed the resulting small-size ZnO nanoparticles in the composition taught by Batdorf because the method enables the production of highly dispersed-in-water small-size ZnO nanoparticles.

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19. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batdorf et al. (US 6,342,556 B1) in view of Smith et al. (US 4,981,882).

20. Regarding the limitations in these claims, the acrylic composition of claim 1 has been shown to be unpatentable over Batdorf as set forth above. However, Batdorf fails to teach a use of polymerization of an acrylic monomer to encapsulate the ZnO nanoparticles.

21. Smith et al. (Smith, hereafter) teaches a method for enhancing encapsulation efficiency in coating particles in aqueous dispersions (Title). The particles to be encapsulated include TiO₂ and ZnO nanoparticles having an average size of 100-700 nm (col. 6, lines 15 & 62). However, depending on the types of application, the particles can be much smaller, such as 5-10 nm (col. 7, line 1). The method of encapsulation comprises contacting the particles with at a carboxylic acid-containing monomer such as (meth)acrylic acid or maleic acid to form an initial coating then adding more acrylic monomers followed by polymerization to effect particle encapsulation (Example 1). The coated particles are for use in paints, molding resins, and other applications (col. 6, lines 63-66). **[Motivations]** Since the encapsulation efficiency is close to 100% (col. 18, line 56), the method enables the production of coated particles that are well dispersed in aqueous medium and agglomeration is avoided. The coated particles can be obtained in dry form and can still be re-dispersed without undue agglomeration or undue grinding (col. 16, lines 29-38).

22. In light of such benefits, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified the composition

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taught by Batdorf by using the method taught by Smith to encapsulate the ZnO nanoparticles with an acrylic polymer of low acid value so that the stability of the particles in the composition is enhanced (i.e., falling out problem is minimized or eliminated) and the distribution of the particles in a coating is more uniform without agglomeration.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vu Nguyen whose telephone number is (571)270-5454. The examiner can normally be reached on M-F 7:30-5:00 (Alternating Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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